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COTTON'S PLACE IN THE WAR

Remarks by Dr. Henry G. Knight, Chief, Bureau of Agricultural Chemistry and Engineering, United States Department of Agriculture, before the Third Annual Cotton Research Congress, Dallas, Texas, July 9, 1942.

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Our way of living has undergone great changes since the last annual meeting of the Cotton Research Congress. A year ago we were speaking of National Defense and our thinking was mostly along that line. Now we are engaged in a war and our actions and thoughts are directed toward achieving the goal of victory. This is true not only of individuals but also of entire industries and the people of the nation as a whole.

A year ago the people in various branches of the cotton industry were concerned mostly with problems of National Defense. There were exceptions, of course. Here and there we found certain individuals who were urging the cotton industry to prepare for war, but for the most part these people were looked upon as alarmists and scant heed was paid to their urgings. Today we are in a war. Fortunately, an appreciation of what we are facing did not come too late, for the change from the rather half-hearted and sometimes aimless efforts engendered by an atmosphere of defense, to the purposeful action required for war, has been rapid. Trivial matters are being brushed aside and attention focused on things essential to the Nation's war effort. The physical changes within the cotton industry are not yet complete, but the proper steps have been taken, and it can truly be said that the cotton industry is now on a wartime basis.

Statistics are usually dull, but let me give you a few which indicate the extent to which cotton is now being used in the Nation's war effort. A recently completed survey by the War Production Board shows that in April of this year, 37 percent of the total production of cotton weaving mills, and 40 percent of the total production of cotton yarn mills, was going into what they termed defense orders. On April 20, the War Production Board issued an order directing a large number of cotton mills to convert a substantial part of their equiment over to the production of fabrics for agricultural bags. This converted production will amount to 13 percent of present weaving capacity. Further orders now being prepared by the War Production Board to assure adequate supplies of military and essential civilian fabrics will require an additional 38 percent of present weaving capacity, and will bring the total percentage of production on essential fabrics up to 88 percent.

Figures on total domestic cotton consumption are also worthy of note. I know you are all familiar with these so I shall merely mention the fact that the current rate of consumption is nearly equal to annual production and nearly 70 percent greater than during the last World War.

These figures are significant but they tell only part of the story. The essentialness of cotton to the Nation's war effort can better be appreciated by comparing it with other products which are generally recognized as being of vital importance. In this connection, I was rather struck with a statement made the other day by Mr. Everett of the Cotton Textile Institute, in which he said that cotton is more important to our Nation today than rubber. This may seem startling, especially to some of us whose tires are wearing thin, but a moment's reflection will show that this actually is true. In the first place, we need many times as much cotton as we do rubber - something like 2-1/2 million tons per year as compared to less than one million tons of rubber. Moreover, substitutes for cotton are much less satisfactory and much more expensive than are substitutes for rubber. Both of these products are of the utmost importance, of course, and we should be grateful that of one of them - cotton - we have an ample supply.

Although it is true that we do have an ample supply of cotton, we should not dismiss this fact too lightly. Mere quantity alone is not sufficient. For example, many of the military fabrics now being produced have placed a heavy demand on high quality, extra-staple cottons. To meet this heavy demand, plantings of high quality, extra-staple cottons are materially greater this year than for the last few seasons. That this was done, is a tribute not only to cotton producers for their cooperation, but also to cottonseed breeders whose work made these increased plantings possible.

What are the cotton products so essential to our war effort? There are literally hundreds of different items and it would be impossible to name all of them. In fact, if you were to take a notebook and walk around one of our big Army camps, you could spend an entire day jotting down a list of war uses for cotton and still have a very incomplete list. Some of the more obvious uses could be readily observed, such as uniforms and other articles of clothing, tents, and tarpaulins of various kinds, but many of them would escape notice. For example, electrical insulating yarns for wiring in tanks, warships, and airplanes, is a small but important war use for cotton. In the airplane factories themselves, cotton conveyor belts carry hundreds of parts to the assembly line and help speed up production. Certain types of powder bags for guns are now made from cotton where silk was once considered the only satisfactory material. Parachute harness for aviators and paratroops are made from special high-strength cotton yarns. Millions of yards of cotton fabrics are being used for sandbags and camouflage fabrics. For service in Alaska and other cold regions, durable, waterproof cotton sleeping bags are keeping soldiers warm in temperatures ranging down to 40 degrees below zero. Another cold-climate military use for cotton is the white windproof fabric being used for ski troop uniforms. Cotton is being used for machine gun cartridge belts, surgical bandages, gas masks, barrage balloons, and airplane fabrics.

These are a few of the direct military uses. There are others, non-military in nature, but equally as important, in which cotton is rendering outstanding service. One of these is bags for food and other agricultural products. Bags are so essential to the handling and shipping of agricultural products that if supplies of new bags were cut off for 60 days large sections of our country would be threatened with starvation. In normal times, this country uses about 750 million yards of cotton fabrics and an approximately equal quantity of burlap for agricultural bags. Owing to the almost complete stoppage of burlap imports and to increased shipments of food to our allies, more than 1-1/2 billion yards of cotton bag fabrics will be required during the next 12 months. This is the reason why the War Production Board has ordered the allocation of additional looms in the cotton-textile industry to the manufacture of bag fabrics.

Another important use for cotton fabrics for which an adequate supply must be assured is work clothing. And then there is a certain minimum amount of other types of clothing, modern styles notwithstanding, required for civilian use. As I mentioned a moment ago, the War Production Board is now taking steps to assure adequate supplies of these fabrics.

I could enumerate other essential military and nonmilitary uses for cotton, but I think the ones already mentioned are sufficient to illustrate the importance of cotton in the Nation's war effort. Let us now look at these uses from another viewpoint. What is it that makes cotton such a valuable textile fiber?

When we consider the multitude of different products into which cotton can be made, and the wide range of properties which these products possess, we perceive one of the reasons, namely, its adaptability. When we consider the low price and great serviceability of cotton products in comparison to most of those made from other textile fibers, we arrive at two other reasons: low price and durability. These three characterizations, then - adaptability, low price, and durability - are the basis of cotton's usefulness.

There is a fourth factor, however, which is sometimes overlooked in seeking to account for the widespread use of cotton. This is man's ingenuity in making use of the versatile properties of cotton. Some of the military products now in use were developed within the past two or three years. Parachute harness, for example, was developed to replace harness formerly made from linen. Moreover, most of these military products represent great improvements over similar products used during the last war. Tents and tarpauline are now water-, flame-, and mildew-proofed, and uniforms have been greatly improved in many ways.

But as widespread as is the present use of cotton in the Nation's war effort, there is still an urgent demand to adapt it to an almost endless number of additional uses and to improve its performance in many present uses. Shortage of various imported fibers makes some of the developments necessary or desirable. For example, our imports of Manila fiber have been cut off, as have most of our imports of sisal. Products normally made from these fibers, such as cordage, are in heavy demand today. Silk imports, as you know, have been shut off for some time, and flax and linen are no longer available in sufficient quantities from foreign sources. Not all, but many, of the products made from these imported fibers can be made satisfactorily from cotton, if only the proper effort is made to adapt cotton to these uses.

Research and developmental work on new and improved cotton products is now being conducted by many private, public and semi-public organizations. Some of this work has been in progress for many years but never before on such an extensive scale, nor has it ever had the backing that it has today. The war has stimulated research on cotton products, but even before the war there was a growing realization throughout the entire industry of the value of this type of work. The consideration given by these Annual Research Congress's to research of this nature is itself strong evidence to this effect.

I think most of you are familiar with the cotton research program of our Southern Regional Research Laboratory in New Orleans. A year ago part of this program was just getting under way. With the completion of the experimental textile mill some time this month, the program will be in nearly full operation. The research work on cotton at the Southern Laboratory and, in fact, all of the work of the Bureau of Agricultural Chemistry and Engineering of which it is a part, is now specifically directed toward aiding the Nation in the war effort. Most of the projects which might require several years to yield useful results have been deferred until the end of the war. Short-time special projects of a war effort nature are given precedence over all others.

You may, perhaps, be interested in some of the war projects on which the Southern Laboratory is now working. One of them is the use of lint cotton as a source of cellulose for smokeless powder. Several years ago, we used to get suggestions from all over the country that lint cotton be used as a source of cellulose. Our replies all pointed out that lint cotton was too expensive in comparison with linters and wood pulp to be used for this purpose. Cotton lint is still much higher-priced than either linters or wood pulp, but today the situation has changed. The demand for smokeless powder made from linters has increased tremendously and there is considerable doubt as to the adequacy of linter supplies. In such an eventuality, cellulose made from cotton lint, which has the same characteristics as that made from linters, will be cheap at any reasonable price.

For processing on commercial purification equipment, the length of the fiber has to be approximately the same as linters. Technologists at the Southern Laboratory have adapted two types of commercial cutting machines to the cutting of lint cotton on a large scale, and in cooperation with a large linter purifier and the Naval Powder Factory, several tons of lint cotton have been cut, purified, and manufactured into smokeless powder. The technologists are now working on the development of a new type of cutter designed for greatly increased capacity and higher mechanical efficiency. If this new type cutter can be satisfactorily developed, so much the better, but even if it should not be, the work already completed with available commercial cutters has assured a supply of cellulose adequate to meet any conceivable shortage of linters.

Another war project deals with treatments for sandbag fabrics to protect them against attack by soil micro-organisms. One phase of this research was completed several months ago and the results furnished the War Department for their use in purchasing sandbags. The British discovered early in the War that untreated sandbags rotted so quickly that reliable service could not be obtained from them. The treatments they used were developed only for burlap fabrics, however, and when this work was begun there was little information available on the relative effectiveness of different commercial treatments for cotton fabrics. This work is being continued and includes the development of new and more effective treatments. One of these new treatments, in particular, appears promising and will probably have important peace-time applications as well.

Cotton fire hose to replace linen fire hose, and plastic-lined cotton hose to replace rubber-lined hose are two other projects. The latter project is carried on in cooperation with a large cotton manufacturer who is handling the plastic lining part of the work.

Binder twine for harvesting small grains and other crops is an essential item in our food supply. There is a possibility that supplies of binder twine made from imported henequen and sisal will be inadequate for 1943, so the Southern Laboratory is working with a large twine manufacturer on the development of a suitable cotton binder twine.

Other war projects include work on plastic-coated or impregnated fabrics for replacing rubberized fabrics, improved mesh fabric for use as a base for nonshatterable transparent plastic substitutes for window glass, and several others which cannot be mentioned because of their war nature.

The examples I have just given of research on war uses of cotton have all been taken from the work of the Southern Regional Research Laboratory because I am naturally more familiar with this work than that of any other organization. There are, of course, many organizations doing similar work, and the combined efforts of all such organizations are contributing much to the efficient prosecution of the war. At the same time, this research and development work is leading to numerous new and extended uses for cotton, many of which will be useful in peace time.

One of the biggest hurdles to making a new or modified product commercially acceptable is that of getting it used in large quantities over a sufficient period of time to permit consumers to become familiar with it. Cotton products are no exceptions. The great demand for cotton created by the war has two aspects: First, cotton is filling an essential need, and second, the many new and extended uses into which large quantities of cotton are now going is providing an opportunity for more people to become familiar with the many valuable properties of cotton. A large number of these uses were formerly supplied by imported fibers and by certain domestically produced fibers of which there is a shortage. In many of these uses cotton was formerly used to a greater extent than it has been in recent years. In fact, as a prominent man connected with the cotton-textile industry recently remarked, "the American people are rediscovering cotton."

We should be thankful that we have such an abundance of cotton at a time when we need every pound that can be manufactured into products essential for winning the war. When the war is over, we should bend every effort to extend the uses of cotton even further. Cotton is a heritage we can not afford to squander through neglect.

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